



UGANDA NATIONAL EXAMINATIONS BOARD

PRIMARY LEAVING EXAMINATION

2024

MATHEMATICS

Time Allowed: 2 hours 30 minutes

| Random No. | | | | | | Personal No. | | |
|------------|--|--|--|--|--|--------------|--|--|
| | | | | | | | | |

Candidate's Name: T. Emmanuel Ekeya

Candidate's Signature: 0789344546

District ID No.

Read the following instructions carefully:

1. Do not write your **school or district name** anywhere on this paper.
2. This paper has **two** sections: **A** and **B**. Section **A** has **20** questions and section **B** has **12** questions. The paper has **15 printed pages**.
3. Answer **all** the questions. **All** the working for both sections **A** and **B** must be shown in the spaces provided.
4. **All** the working **must** be done using a **blue** or **black** ball point pen or ink. Any work done in pencil other than graphs and diagrams will **not** be marked.
5. **No calculators** are allowed in the examination room.
6. Unnecessary **changes** in your work and handwriting that cannot be read easily may lead to **loss of marks**.
7. Do not fill anything in the table indicated "**FOR EXAMINERS' USE ONLY**" and in the boxes inside the question paper.

| FOR EXAMINERS' USE ONLY | | |
|----------------------------|-------|--------------|
| QN NO. | MARKS | EXR'S NO. |
| 1 - 5 | | |
| 6 - 10 | | |
| 11 - 15 | | |
| 16 - 20 | | |
| 21 - 22 | | |
| 23 - 24 | | |
| 25 - 26 | | |
| 27 - 28 | | |
| 29 - 30 | | |
| 31 - 32 | | |
| TOTAL | | |

SECTION A: 40 MARKS

*Answer all the questions in this section.
Questions 1 to 20 carry two marks each.*

1. Work out:

$$\begin{array}{r} 3 \quad 5 \\ \times \quad 3 \\ \hline 10 \quad 5 \end{array}$$

Side work

$$\begin{aligned} 3 \times 5 &= 15 \\ 3 \times 3 &= 9 \\ 9 + 1 &= 10 \end{aligned}$$

2. Write CXIV in Hindu Arabic numerals.

Solution

$$\begin{array}{ccc} C & X & IV \\ \downarrow & \downarrow & \downarrow \\ 100 & 10 & 4 \end{array}$$

$$\begin{array}{r} 100 \\ + 10 \\ \hline 110 \end{array}$$

$$\therefore CXIV = 114$$

3. Given that $M = \{b, a, t\}$, write down all the subsets of set M.

Solution

Empty set $\rightarrow \{\}$

One Member sets $\rightarrow \{b\}, \{a\}, \{t\}$.

Two member sets $\rightarrow \{b, a\}, \{b, t\}$
 $\{a, t\}$

Mother set $\rightarrow \{b, a, t\}$.

4. Find a fraction equivalent to $\frac{4}{7}$.

Solution

$$\frac{4 \times 2}{7 \times 2} = \frac{8}{14}.$$

$\therefore \frac{4}{7}$ is equivalent to $\frac{8}{14}$

OR $\frac{4 \times 3}{7 \times 3} = \frac{12}{21}$

$\therefore \frac{4}{7}$ is equivalent to $\frac{12}{21}$

Note: There are so many fractions equivalent to $\frac{4}{7}$

5. Expand 3405 using powers of ten.

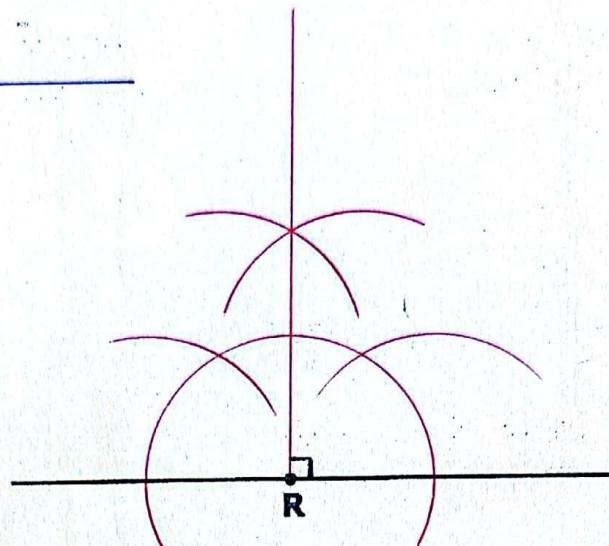
Solution

| 10^3 | 10^2 | 10^1 | 10^0 |
|--------|--------|--------|--------|
| 3 | 4 | 0 | 5 |

$$\therefore 3405 = (3 \times 10^3) + (4 \times 10^2) + (5 \times 10^0)$$

6. Using a ruler and a pair of compasses only, construct a right angle at point R.

Solution



7. Given that $a = 3$, $b = 1$ and $n = 2$, find the value of $2a^n b$.

Solution

$$\begin{aligned}2a^n b &= 2 \times a^n \times b \\&= 2 \times 3^2 \times 1 \\&= 2 \times (3 \times 3) \times 1 \\&= 2 \times 9 \times 1 \\&= 18 \times 1\end{aligned}$$

$$\therefore 2a^n b = 18$$

8. Find the next number in the sequence:

$$\begin{array}{ccccccc}2, & 3, & 6, & 11, & 18, & \dots & 27 \\+1 & +3 & +5 & +7 & +9 & &\end{array}$$

(odd numbers)

$\therefore 27$ is the next number in the sequence.

| |
|---|
| Side Work |
| $\begin{array}{r} 18 \\ + 9 \\ \hline 27 \end{array}$ |

9. It takes Ankunda 35 minutes to walk from school to home. If she arrived home at 12:20 p.m., what time did she leave school?

Solution

$$\text{Departure Time} = \text{Arrival Time} - \text{Duration}$$

$$\begin{array}{rcl} \text{Hours} & & \text{Min.} \\ \hline 1 & & 20 \\ - & 0 & \\ \hline 1 & : & 45 \text{ a.m.} \end{array}$$

Side work
 $60 + 20 = 80$

\therefore She left school at 3:11:45 a.m.

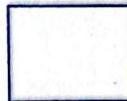
Turn Over

10. Otunu sold a goat and made a profit of sh 18,000. The cost price of the goat was sh 90,000. Calculate Otunu's percentage profit.

Solution

$$\begin{aligned}\text{Percentage profit} &= \left(\frac{\text{Profit}}{\text{Cost price}} \times 100 \right) \% \\ &= \left(\frac{20}{\cancel{\text{Sh. } 18,000}} \times \cancel{100} \right) \% \\ &= 20\%\end{aligned}$$

$\therefore 20\%$ was Otunu's percentage profit.



11. Find the largest number that divides both 24 and 18 without a remainder.

Solution

GCF of 24 and 18

| | | |
|---|----|----|
| 2 | 24 | 18 |
| 3 | 12 | 9 |
| 4 | 3 | |
| | | |

$$2 \times 3 = 6$$

$\therefore 6$ is the largest number

that can divide 24 and 18.

12. Work out: $42 - 21 \div 3$

Solution

$$42 - 21 \div 3$$

We use Bodmas

$$42 - (21 \div 3)$$

$$42 - 7$$

$$\begin{array}{r} 3 \quad 12 \\ 4 \quad | \quad 2 \\ - \quad 7 \\ \hline 3 \quad 5 \end{array}$$

$$\therefore 42 - 21 \div 3 = 35$$

Side Work

$$\begin{array}{r} 21 \\ \hline 3 \\ \overline{)7} \\ 3 \\ \hline 1 \\ 3 \\ \hline 1 \\ 1 \\ \hline \end{array}$$

13. The range of a set of scores is 23. The highest score is 76. Find the lowest score.

Solution

$$\text{Range} = 23$$

$$\begin{aligned}\text{Highest score} - \text{Lowest score} &= 23 \\ 76 - \text{Lowest score} &= 23 \\ 76 - 76 - \text{Lowest score} &= 23 - 76 \\ - \text{Lowest score} &= -53 \\ \text{Lowest score} &= 53\end{aligned}$$

OR

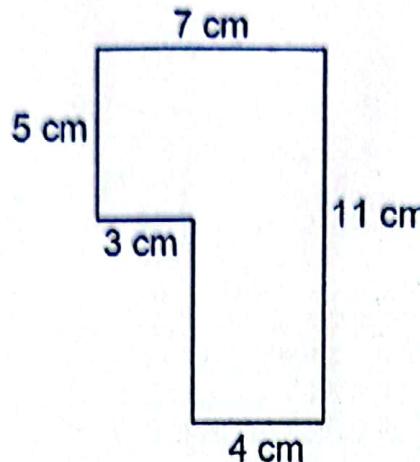
$$\begin{aligned}\text{Lowest score} &= \text{Highest score} - \text{Range} \\ &= 76 - 23 \\ &= 53\end{aligned}$$

$$\text{Lowest score} = 76 - 23$$

$$\text{Lowest score} = 53$$

14. Find the perimeter of the figure below.

Solution



Perimeter = sum of all sides

$$\text{Perimeter} = 11\text{cm} + 7\text{cm} + 5\text{cm} + 3\text{cm} + 4\text{cm}$$

$$\text{Perimeter} = 18\text{cm} + 12\text{cm}$$

$$\text{Perimeter} = 30\text{cm.}$$

15. A school cook requires 24 kg of maize flour to feed 120 pupils. Find in grammes, the amount of maize flour the cook would require to feed 3 pupils.

Solution

120 pupils feed on 24 kg
(÷)

1 pupil feeds on $\frac{24}{120}$ kg

3 pupils feed on $(\frac{24}{120} \times 3)$ kg

3 pupils feed on 0.6 kg

0.6 kg to x 1000 grammes

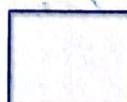
1 kg = 1000 grammes

0.6 kg = ~~0.6 × 1000~~ grammes

0.6 kg = 6 × 100 grammes

0.6 kg = 600 grammes.

∴ 600 grammes of maize flour will feed 3 pupils.



16. Akiiki bought a suit at Kenya shillings (Ksh) 11,500. If the exchange rate was 1 Ksh = Ug.sh 32, how much money would Akiiki have paid for the suit in Uganda shillings (Ug.sh)?

Solution

K.sh 11,500 $\xrightarrow{(x)}$ to Ug.sh.

$$\text{K.sh } 1 = \text{ Ug.sh } 32$$

$$\text{K.sh } 11,500 = \text{ Ug.sh } 32 \times 11,500$$

$$\text{K.sh } 11,500 = \text{ Ug.sh } 368,000$$

Side Work

$$\begin{array}{r}
 11500 \\
 \times 32 \\
 \hline
 23000 \\
 + 34500 \\
 \hline
 368000
 \end{array}$$

\therefore Akiiki would pay Ug.sh 368,000

17. Solve: $3 - 2y < 9$

Solution

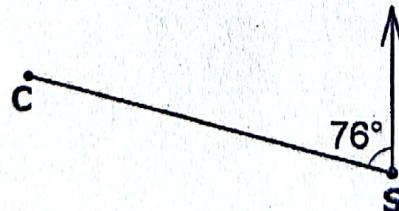
$$\begin{aligned}
 3 - 2y &< 9 \\
 -3 &\quad \uparrow \\
 3 - 3 - 2y &< 9 - 3 \\
 -2y &< 6
 \end{aligned}$$

$$\begin{array}{r}
 \cancel{-2y} < \cancel{6}^3 \\
 \cancel{+2} \quad \cancel{-2} \\
 y > -3
 \end{array}$$

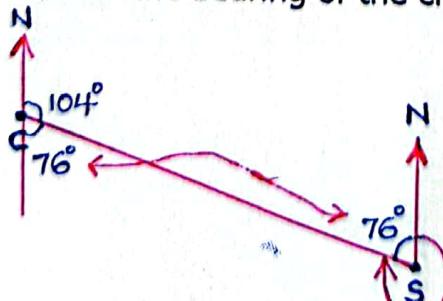
Side Work

$$\begin{array}{r}
 + \div - = - \\
 3 \div -1 = -3
 \end{array}$$

18. The diagram below shows the position of a church (C) from a school (S).



Find the bearing of the church from the school.



Bearing

$$\begin{array}{r}
 2 15 \\
 3 8 10 \\
 - 7 6 \\
 \hline
 2 8 4
 \end{array}$$

DR

$$\begin{array}{r}
 180^\circ \\
 + 104^\circ \\
 \hline
 284^\circ
 \end{array}$$

19. If today is Monday and a cake baked today can expire after 16 days, what day of the week will the cake expire?

Solution

| Sun | Mon | Tue | Wed | Thur | Fri | Sat |
|-----|-----|-----|-----|------|-----|-----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |

$$\begin{aligned} \text{Mon} + 16 &= - \text{(finite 7)} \\ 1 + 16 &= - \text{(finite 7)} \\ 17 \div 7 &= 2 \text{ rem } 3 \\ &= 3 \text{ (finite 7).} \end{aligned}$$

20. One morning, the temperature on top of a mountain was -3°C . The temperature rose by 8°C in the afternoon. Find the afternoon temperature.

Solution

$$\begin{array}{r} -3^{\circ}\text{C} \\ + 8^{\circ}\text{C} \\ \hline 5^{\circ}\text{C} \end{array}$$

$\therefore 5^{\circ}\text{C}$ is the afternoon temperature.

3 stands for Wednesday.

\therefore The cake will expire on Wednesday.

Note: When they ask for the day after the mentioned duration, we don't subtract one day, like it was in PLE last year when we subtracted.

Side work.

| | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| -ves | - | - | - | | | | | | |
| +ves | (+) | (+) | (+) | (+) | (+) | (+) | (+) | (+) | (+) |

$+5$ ↘

SECTION B: 60 MARKS

Answer all the questions in this section.
Marks for each question are indicated in the brackets.

21. Work out: $\frac{2.92 - 2.36}{0.068 + 0.012}$ (04 marks)

Solution

$$(2.92 - 2.36) \div (0.068 + 0.012)$$

| | |
|----------|---------|
| 2.92 | 8 |
| $- 2.36$ | 0.068 |
| 0.56 | 0.012 |

$$\frac{0.56}{0.08}$$

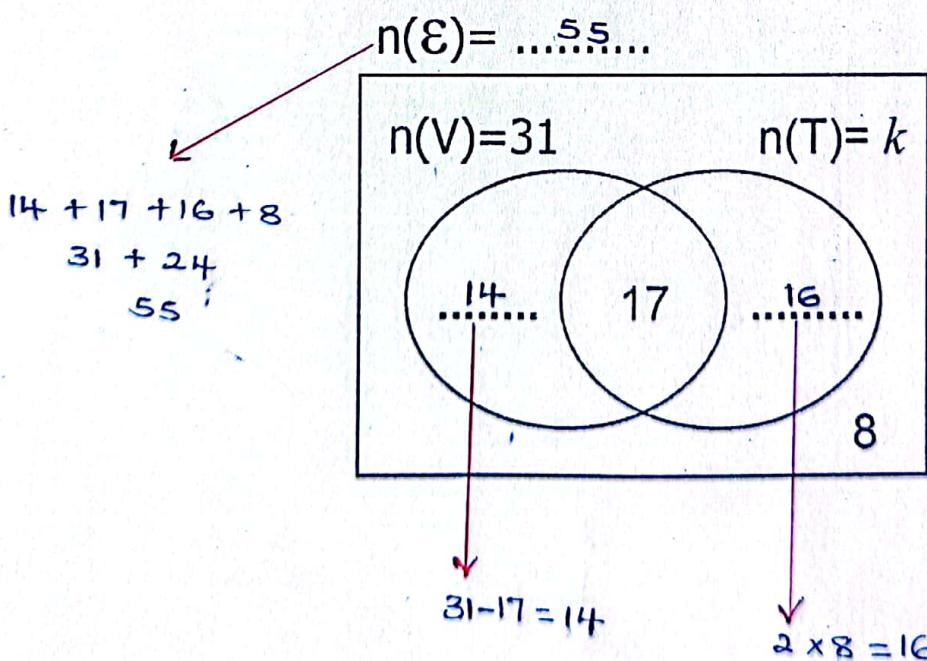
$$0.56 \div 0.08$$

$$\begin{array}{r} 56 \\ 100 \\ \times 7 \\ \hline 56 \\ 100 \\ \times 8 \\ \hline 7 \end{array}$$

$$\therefore \frac{2.92 - 2.36}{0.068 + 0.012} = 7$$

22. In a class, 31 pupils like volleyball (V) and k pupils like table tennis (T). 17 pupils like both games while 8 pupils do not like any of the two games. The number of pupils who like table tennis only is twice the number of those who do not like any of the two games.

- (a) Use the given information to complete the Venn diagram below. (04 marks)



(b) Find;

(i) the value of k .

Solution

$$k = 17 + 16$$

$$\therefore k = 33$$

(01 mark)

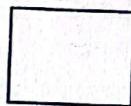
(ii) the probability that a pupil picked at random from the class likes both volleyball and table tennis.

(01 mark)

Solution

$$\text{Probability} = \frac{n(D.C)}{T.C}$$

$$\text{Probability} = \frac{17}{55}$$



23. A taxi and a bus were hired to transport people for a function. The taxi transports 14 people when full while the bus transports 69 people when full. The taxi made five trips and the bus made one trip. The taxi and the bus made the trips when full.

(a) Find the total number of people that were transported to the function.

Solution

Number of people transported by Taxi

$$\begin{array}{r} 2 \\ 1 \quad 4 \\ \times \quad 5 \\ \hline 7 \quad 0 \end{array}$$

people.

but: the bus made only one trip.

(03 marks)

Total number of people transported.

$$\begin{array}{r} 7 \quad 0 \\ + \quad 6 \quad 9 \\ \hline 1 \quad 3 \quad 9 \end{array}$$

people.

(b) The taxi owner was paid sh 56,000 per trip. Calculate the amount of money that was paid for each person.

(02 marks)

Solution

14 people $\xrightarrow{\text{paid}}$
1 person paid

$$\begin{array}{r} \text{sh } 56,000 \\ - \quad 4,000 \\ \hline \text{sh } 52,000 \\ - \quad 7 \\ \hline \end{array}$$

9

1 person paid sh. 4000

∴ Sh 4,000 was paid
for each person.

Turn Over

24. Given that $202_p = 1221_{\text{three}}$, find the value of p .

(04 marks)

Solution

$$\begin{array}{|c|c|c|} \hline P^2 & P^1 & P^0 \\ \hline 2 & 0 & 2 \\ \hline \end{array} = \begin{array}{|c|c|c|c|} \hline 3^3 & 3^2 & 3^1 & 3^0 \\ \hline 1 & 2 & 2 & 1 \\ \hline \end{array}$$

$$(2 \times P^2) + (2 \times P^0) = (1 \times 3^3) + (2 \times 3^2) + (2 \times 3^1) + (1 \times 3^0)$$

$$2 \times P^2 + 2 \times 1 = (1 \times 3 \times 3 \times 3) + (2 \times 3 \times 3) + (2 \times 3) + (1 \times 1)$$

$$2P^2 + 2 = 27 + 18 + 6 + 1$$

$$\cancel{2P^2 + 2} = \cancel{52}$$

$$\frac{\cancel{2P^2 + 2}}{2} = \frac{52 - 2}{2}$$

$$\sqrt{P^2} = \sqrt{25}$$

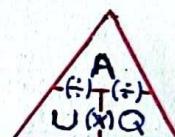
$$P = 5$$

$\therefore P \text{ is base five}$

25. The table below shows the amount of money Rukia paid for food stuff to a businesswoman after she was given a discount of sh 2,200.

(a) Study and complete the table.

(03 marks)



| Item | Quantity | Cost per kg | Amount |
|----------------|----------|-------------------|------------------|
| Rice | 4 kg | sh 3,800 | sh ...1,5,2,00 |
| Beans | .5. kg | sh 5,000 | sh 30,000 |
| Irish Potatoes | 0.5 kg | sh ...3,2,00..... | sh 1,600 |
| Total | | | sh 46,800 |

| Rice | Beans | Irish Potatoes |
|--|--|--|
| $A = U \times Q$ $sh. 3800$ $\times \frac{1}{4}$ $sh. 15,200$ | $Q = A \div U$ $sh. 3800 \div 6$ $sh. 6,000$ 6 Kg | $U = A \div Q$ $sh. 1600 \div \frac{1}{2}$ $sh. 3,200$ |

(b) Find how much money Rukia would have paid without the discount.

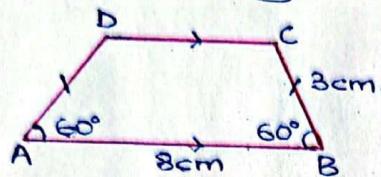
(02 marks)

$$\begin{array}{r}
 sh. 46,800 \\
 + sh. 2,200 \\
 \hline sh. 49,000
 \end{array}$$

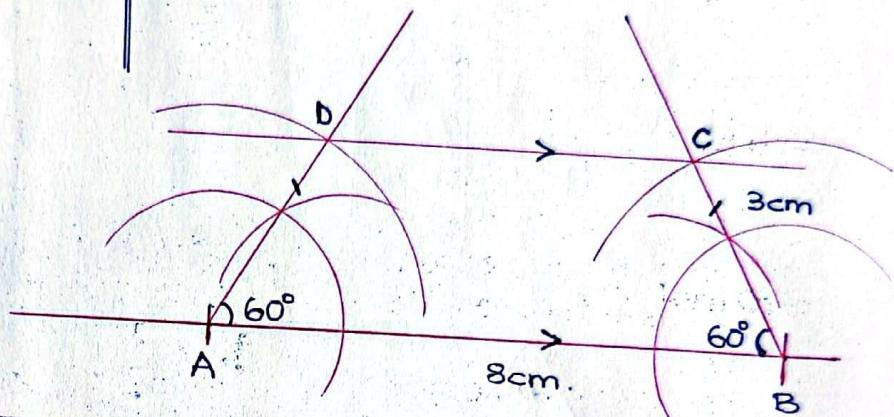
$\therefore \text{Rukia would pay sh } 49,000 \text{ without discount.}$

26. (a) Using a ruler and a pair of compasses only, construct a trapezium ABCD in which line AB = 8 cm, angle DAB = angle ABC = 60° and line AD = BC = 3 cm. (04 marks)

Sketch diagram.



Accurate diagram.



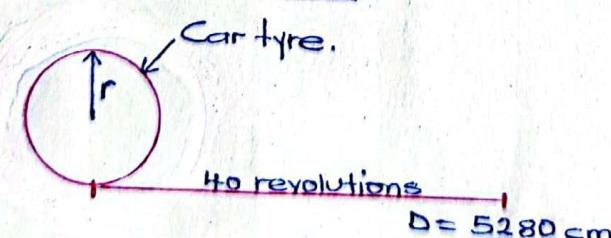
- (b) Measure angle ADC.

$$120^\circ \pm 1^\circ$$

(01 mark)

27. A motorcycle tyre made 40 complete turns to cover a distance of 5280 cm. Calculate the radius of the tyre. (Use $\pi = \frac{22}{7}$) (04 marks)

Solution



Circumference of car tyre.

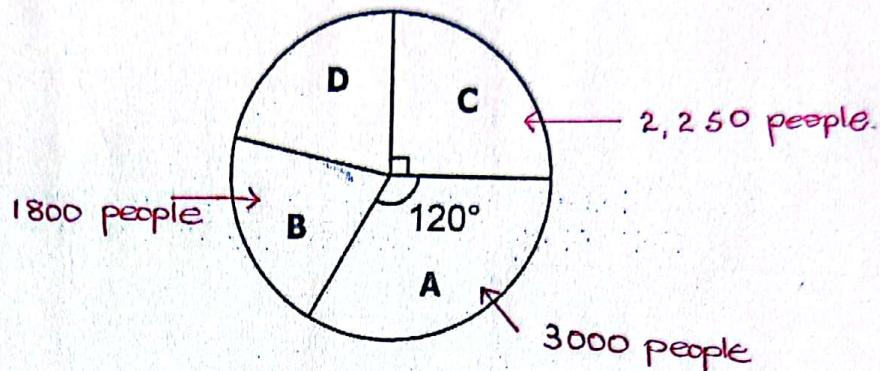
$$\begin{array}{r} \text{Distance} \\ \text{Number of revolutions} \\ \hline 5280 \text{ cm} \\ \hline 132 \text{ cm.} \end{array}$$

11

$$\begin{aligned} \text{Circumference} &= 132 \text{ cm} \\ 2\pi r &= 132 \text{ cm} \\ 2 \times \frac{22}{7} \times r &= 132 \text{ cm} \\ 7 \times \frac{44r}{7} &= 132 \text{ cm} \times 7 \\ 44r &= 132 \text{ cm} \times 7 \\ r &= \frac{132 \times 7}{44} \\ r &= 3 \text{ cm} \times 7 \\ \therefore \text{Radius} &= 21 \text{ cm.} \end{aligned}$$

Turn Over

28. The pie chart below represents the population of four towns A, B, C and D. The population of town A is 3000 people and that of town B is 1800 people. Study the pie chart and use it to answer the questions that follow.



Calculate the population of;

(a) town C.

Solution

$$120^\circ \text{ rep. } \frac{3000}{120} \text{ people}$$

$$1^\circ \text{ rep. } \frac{3000}{120} \text{ people}$$

$$90^\circ \text{ rep. } \left(\frac{3000}{120} \times 90 \right) \text{ people}$$

$$90^\circ \text{ rep. } 25 \times 90 \text{ people. (04 marks)}$$

$$90^\circ \text{ rep. } 2,250 \text{ people.}$$

$\therefore 2,250$ people are in town C

Note: Try other approaches

(b) town D.

Total population of the four towns

$$1^\circ \text{ rep. } \frac{3000}{120} \text{ people (from part a)}$$

$$360^\circ \text{ rep. } \frac{3000}{120} \times 360 \text{ people}$$

$$360^\circ \text{ rep. } 9000 \text{ people.}$$

Population of town D. (02 marks)

$$9,000 - (3,000 + 1,800 + 2,250)$$

$$9,000 - 7,050$$

$$\begin{array}{r} 9000 \\ - 7050 \\ \hline 1950 \end{array}$$

29. (a) Solve: $\frac{5t-6}{2} = t+12$ (02 marks)

Solution

$$\frac{5t-6}{2} = t+12$$

$$2 \times \frac{5t-6}{2} = (t+12)2$$

$$\begin{aligned} 5t-6 &= t \times 2 + 12 \times 2 \\ 5t-6 &= 2t + 24 \end{aligned}$$

$$5t-6+6 = 2t+24+6$$

$$5t - 2t = 2t + 30$$

$$3t = 2t - 2t + 30$$

$$3t = \frac{30}{3}$$

$$\therefore t = 10$$

(b) Subtract $(2m - 3)$ from $(5m + 2)$.

(02 marks)

Solution

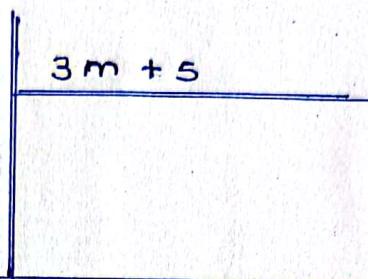
$$(2m - 3) \text{ from } (5m + 2)$$

$$(5m + 2) - (2m - 3)$$

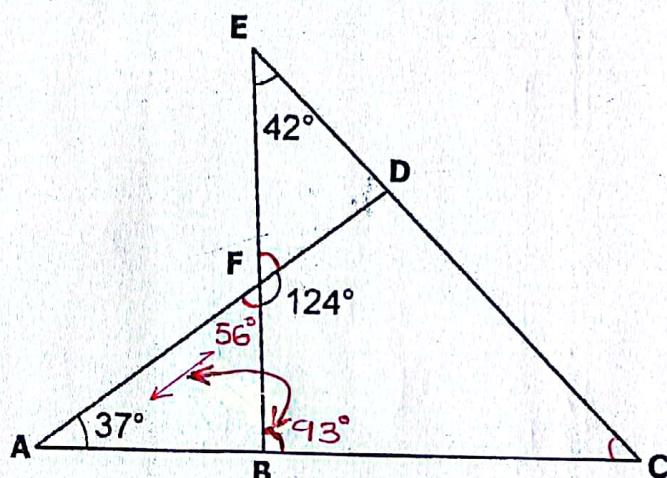
$$5m + 2 - 1 \times 2m - 3 \times -1$$

$$5m + 2 - 2m + 3$$

$$5m - 2m + 3 + 2$$



30. In the diagram below, angle $DAC = 37^\circ$, angle $BEC = 42^\circ$ and angle $BFD = 124^\circ$. Study the diagram and answer the questions that follow.



Find the size of;

(a) angle EBC .

(03 marks)

$$\text{angle } AFB = 180^\circ - 124^\circ \quad (\text{Ls in a straight line}) \\ = 56^\circ$$

$$\text{Angle } EBC = 37^\circ + 56^\circ \quad (\text{Ext. } \angle = 2 \text{ opposite int. } \angle) \\ = 93^\circ$$

$$\therefore \text{Angle } EBC = 93^\circ$$

(b) angle DCA .

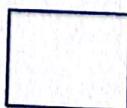
(02 marks)

Solution

$$\text{angle } DCA + 93^\circ + 42^\circ = 180^\circ \quad (\text{Int. } \angle \text{ sum of } \Delta) \\ \text{angle } DCA + 135^\circ - 135^\circ = 180^\circ - 135^\circ$$

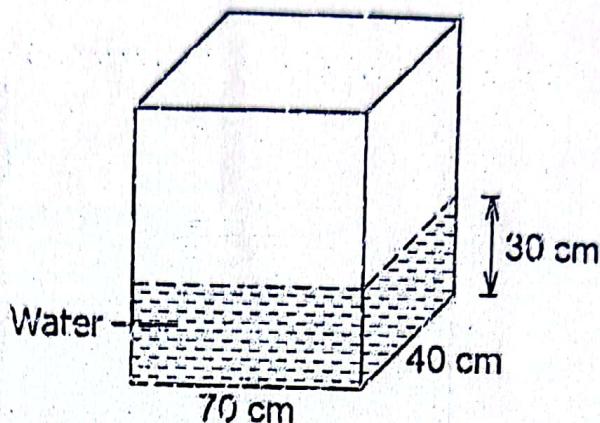
$$\text{angle } DCA = 45^\circ$$

$$\therefore \text{Angle } DCA = 45^\circ$$



Note: Try using other angle properties.

31. The diagram below shows a tank with a rectangular base containing some water. Study and use it to answer the questions that follow.



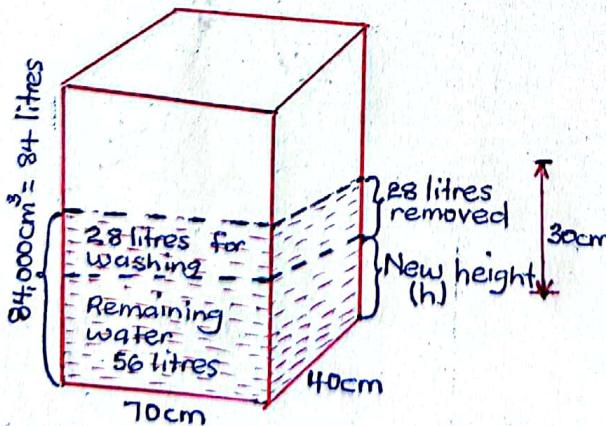
(a) Calculate the volume of the water in the tank.

Solution

(02 marks)

$$\begin{aligned} \text{Volume} &= \text{Base area} \times \text{height} \\ \text{Volume} &= L \times W \times H \\ \text{Volume} &= 70\text{cm} \times 40\text{cm} \times 30\text{cm} \\ \text{Volume} &= 2800\text{cm}^2 \times 30\text{cm} \\ \text{Volume} &= 84,000\text{cm}^3 \end{aligned}$$

(b) If 28 litres of the water was removed for washing clothes, calculate the height of the water that remained in the tank. (04 marks)



Capacity of the water before

$$\begin{aligned} \text{Capacity} &= \left(\frac{\text{Volume}}{1000\text{cm}^3} \right) \text{litres} \\ &= \left(\frac{84,000\text{cm}^3}{1000\text{cm}^3} \right) \text{litres} \\ &= 84 \text{ litres} \end{aligned}$$

$$\begin{aligned} \text{Capacity of remaining water} \\ (84 - 28) \text{ litres} \\ 56 \text{ litres} \end{aligned}$$

Height(h) of the remaining water

$$\begin{aligned} \text{Height} &= \frac{\text{Volume}}{\text{Base Area}} \\ &= \frac{56 \times 1000\text{cm}^3}{70\text{cm} \times 40\text{cm}} \\ &= \frac{56 \times 1000\text{cm}^3}{70\text{cm} \times 40\text{cm}} \\ &= 2 \times 10\text{cm} \\ &= 20\text{cm} \end{aligned}$$

32. A motorcyclist left home for town at 8:00 a.m. riding at a speed of 40 km/h. After 30 minutes, he got a flat tyre which took him 45 minutes to repair. The distance between the home of the motorcyclist and town is 68 km.

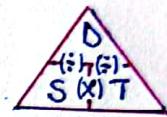
- (a) Find the distance the motorcyclist had covered before he got the flat tyre.

Solution

$$\begin{aligned} S &= 40 \text{ km/h} \\ T &= 30 \text{ min} = \frac{1}{2} \text{ hour} \\ D &=? \\ D &= S \times T \\ D &= \frac{40}{\cancel{h}} \times \frac{\cancel{1}}{2} \\ D &= 20 \text{ km.} \end{aligned}$$

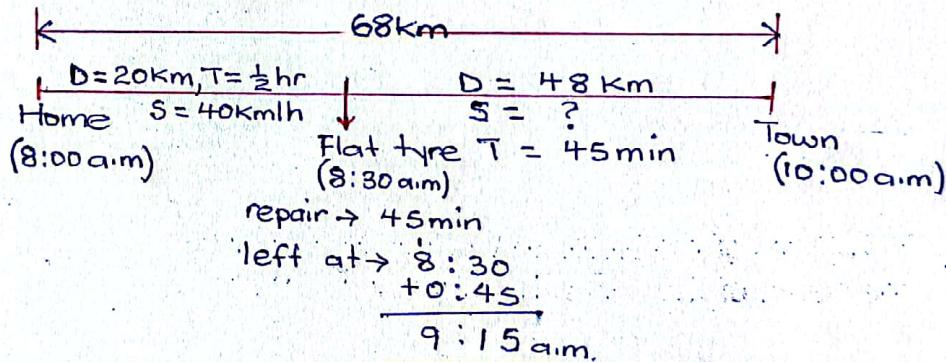
He had covered
20 km.

(02 marks)



- (b) Calculate the speed at which the motorcyclist had to ride in order to reach town at 10:00 a.m. (04 marks)

Solution



Time he started moving after repair

| | |
|--------------------|----------------|
| Hrs | Min |
| 8 : 30 | |
| + 0 : 45 | |
| <u>9 : 15 a.m.</u> | $75 - 60 = 15$ |

Time = 45 minutes

$$\begin{aligned} \text{Speed} &= D \div T \\ &= 48 \text{ km} \div \frac{45}{60} \text{ hr} \end{aligned}$$

Remaining distance to cover

$$(68 - 20) \text{ km}$$

$$48 \text{ km}$$

$$\text{Speed} = \frac{16 \text{ km} \times 4}{\cancel{45} \text{ hr}}$$



$$= \frac{16 \text{ km} \times 4}{\cancel{45} \text{ hr}}$$

$$\text{Speed} = 64 \text{ km/h}$$

Time taken after repair

| | |
|---------------|-------|
| Hrs | Min |
| 1 : 0 | 0 : 0 |
| - 9 | |
| <u>0 : 45</u> | 15 |

END